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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/082,450	02/23/2002	Jian Zhu	681954.0124	8324

72768 7590 05/30/2008

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EXAMINER	
MERED, HABTE	

ART UNIT	PAPER NUMBER
2616	

MAIL DATE	DELIVERY MODE
05/30/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/082,450	ZHU ET AL.	
	Examiner	**Art Unit**	
	HABTE MERED	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 04 January 2008.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 2,3,5 and 6 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 2,3,5 and 6 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 23 February 2002 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The amendment filed on 1/04/2008 has been entered and fully considered.

Claims 2, 3, 5, and 6 are pending in the instant Application. Claims 1, 4, and 7-10 have been previously cancelled. Claims 2, 3, 5, and 6 are the base independent claims.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. **Claims 2, 3, 5, and 6** are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al (Yuan Yang and Jianchao Wang, “A New Self-Routing Multicast Network”, IEEE, December 1999) in view of Li et al (Cheng Li, Howard M. Heys, and R. Venkatesan, "Design and Implementation of the Scalable Multicast Balanced Gamma (Bridgelall) Switch”, IEEE, October 14-16/2002).

Regarding **claim 2**, Yang’99 discloses a method for routing packets through a switching network, wherein the switching network includes multiple stages of switching elements **(See Figures 1, 2, 4, and 5)**, each one of the switching elements receiving packets as local input packets on its input ports and producing packets as local output packets on its output ports each of the packets having a plurality of in-band control signals where each one of the in-band control signals is utilized in a corresponding one of the switching elements as the local in-band control signal for the corresponding

switching element to make switching decisions **(See page 1309, section 7.1, Yang'99 discloses how each multicast message is forwarded in the network using the header of the message as an in-band control to determine the destination address when forwarding from one stage to another)**, the method comprising: coding each one of the in-band control signals of the packets into a plurality of bits based on a predetermined coding algorithm, and generating, with reference to the coding scheme **(See Table 1 – Yang'99 shows an encoding scheme for tag values based on a predetermined coding algorithm)**,

the output bits of the local output packets at each one of the switching elements based on a subset of the bits in the corresponding one of the in-band control signals for each one of the switching elements to route the local input packets arriving at the corresponding switching element, **(See page 1310, Column 1, Lines 3-20)** wherein each one of the switching elements is a *bicast cell* **(In Yang'99's system each switching element is capable of multicasting and therefore is a bicast cell and the definition is shown on page 1300, 2nd Column and the corresponding figures are 3A-3F. Yang'99's definition and description of the state of the switching connection for bicast cell is exactly like the Applicant's description of bicast cell defined on page 169 of the specification and exactly matches Applicant's Figures 2C-2F)** and the local input packets to each one of the switching elements includes idle **(Page 1300 case IV, Page 1306 Lines 13-20, Page 1310 Lines 25-27, Table 1)**, 0-bound **(Table 1)**, 1-bound **(Table 1)** and bicast packet types **(Page 1310, Lines 20-25)**,

wherein each one of the packet types corresponds to a distinct in-band control signal **(Cases 1-4 on page 1300 and in general 2nd column on page 1300)**,

the coding includes coding each of the in-band control signals by two bits **(See in Section 5.1, 1st paragraph Yang'99 initially only uses 4 tag values where it is clear that the in-band control signal can be represented by only two bits. However, Yang'99 uses 3 bits to represent 6 tag values in Table 1 on page 1306 wherein the additional 2 tag values are dummy values as indicated by Yang'99 on page 1305. However, it is clear that such an arrangement wastes in-band bandwidth.)**,

and the coding algorithm includes coding the bits such that the first bit of the code for the in-band control signal corresponding to a 0-bound packet type **(See Case 1 on page 1300)** is different from the first bit of the code for the in-band control signal corresponding to a 1-bound packet type **(See Case 2 on page 1300)**. **(Further Yang clearly shows in Table 1 on page 1308 the encoding scheme for the tag values used as in-band control signal in the packets routed in the multi-stage multicast switch. Clearly three bits are used adequately meeting the claimed limitation of "using at least two bits". Also it is evident from Table 1 the first bit of the code for the 0 bound packet (i.e. tag = 0) is different from the first bit of the 1-bound packet (i.e. tag = 1) where the first bit is the most significant bit).**

Yang'99 fails to disclose that the coding includes coding each one of the in-bound control signals by two bits.

However, the above mentioned claimed limitations are well known in the art as evidenced by Li'101402. In particular, Li101402 discloses that the coding includes

coding each one of the in-bound control signals by two bits **(Li'101402 shows in Section III in Table 1 using only two bits to encode the in-bound control signals used for determining routing destination. Namely the bits are Bit 1 and Bit 0**).

In view of the above, having the method of Yang'99 and then given the well established teaching of Li'101402, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the method of Yang'99 as taught by Li'101402, the motivation for such a modification being to conserve in-band bandwidth by using 2 bits instead of three bits.

Regarding **claim 3**, Yang'99 discloses, a method for routing packets through a switching network, wherein the switching network includes multiple stages of switching elements **(See Figures 1, 2, 4, and 5)**, each one of the switching elements receiving packets as local input packets on its input ports and producing packets as local output packets on its output ports each of the packets having a plurality of in-band control signals where each one of the in-band control signals is utilized in a corresponding one of the switching elements as the local in-band control signal for the corresponding switching element to make switching decisions **(See page 1309, section 7.1, Yang'99 discloses how each multicast message is forwarded in the network using the header of the message as an in-band control to determine the destination address when forwarding from one stage to another)**, the method comprising: coding each one of the in-band control signals of the packets into a plurality of bits based on a predetermined coding algorithm, and generating, with reference to the

coding scheme **(See Table 1 – Yang'99 shows an encoding scheme for tag values based on a predetermined coding algorithm)**,

the output bits of the local output packets at each one of the switching elements based on a subset of the bits in the corresponding one of the in-band control signals for each one of the switching elements to route the local input packets arriving at the corresponding switching element, **(See page 1310, Column 1, Lines 3-20)** wherein each one of the switching elements is a <u>*routing cell*</u> **(In Yang's system each switching element is capable of sorting under a linear order of 0-bound, idle, and 1-bound. This is effectively illustrated on Page 1306, in the second column in the first paragraph. Given this and the fact that the Applicant defines routing cell on page 161 of the specification simply as a sorting cell associated with a set consisting of 0-bound, idle, 1-bound and linearly ordered one can easily conclude Yang's cells are also routing cells.)** and the local input packets to each one of the switching elements includes idle **(Page 1300 case 4, Page 1306 Lines 13-20, Page 1310 Lines 25-27, Table 1)**, 0-bound **(Table 1)**, 1-bound **(Table 1)** and bicast packet types **(Page 1310, Lines 20-25)**, wherein each one of the packet types corresponds to a distinct in-band control signal **(Cases 1-4 on page 1300 and in general 2^{nd} column on page 1300)**,

the coding includes coding each of the in-band control signals by <u>at least two bits</u> **(See in Section 5.1, 1^{st} paragraph Yang'99 initially only uses 4 tag values where it is clear that the in-band control signal can be represented by only two bits. However, Yang'99 uses 3 bits to represent 6 tag values in Table 1 on page 1306**

wherein the additional 2 tag values are dummy values as indicated by Yang'99 on page 1305. However, it is clear that such an arrangement wastes in-band bandwidth.),

and the coding algorithm includes coding the bits such that the first bit of the code for the in-band control signal corresponding to a 0-bound packet type **(See Case 1 on page 1300)** is different from the first bit of the code for the in-band control signal corresponding to a 1-bound packet type **(See Case 2 on page 1300)**. **(Further Yang clearly shows in Table 1 on page 1308 the encoding scheme for the tag values used as in-band control signal in the packets routed in the multi-stage multicast switch. Clearly three bits are used adequately meeting the claimed limitation of "using at least two bits". Also it is evident from Table 1 the first bit of the code for the 0 bound packet (i.e. tag = 0) is different from the first bit of the 1-bound packet (i.e. tag = 1) where the first bit is the most significant bit.).**

Yang'99 fails to disclose that the coding includes coding each one of the in-bound control signals by two bits.

However, the above mentioned claimed limitations are well known in the art as evidenced by Li'101402. In particular, Li101402 discloses that the coding includes coding each one of the in-bound control signals by two bits **(Li'101402 shows in Section III in Table 1 using only two bits to encode the in-bound control signals used for determining routing destination. Namely the bits are Bit 1 and Bit 0**).

In view of the above, having the method of Yang'99 and then given the well established teaching of Li'101402, it would have been obvious to one having ordinary

skill in the art at the time of the invention was made to modify the method of Yang'99 as taught by Li'101402, the motivation for such a modification being to conserve in-band bandwidth by using 2 bits instead of three bits.

Regarding **claim 5**, Yang'99 discloses a system for routing packets comprising: multiple stages of switching elements **(In Yang'99's Figures 1, 2, 4, and 5 contain multiple stages of switching elements)**, each one of the switching elements receiving packets as local input packets on its input ports and producing packets as local output packets on its output ports each of the packets having a plurality of in-band control signals where each one of the in-band control signals is utilized in a corresponding one of the switching elements as the local in-band control signal for the corresponding switching element to make switching decisions **(See page 1309, section 7.1, Yang'99 discloses how each multicast message is forwarded in the network using the header of the message as an in-band control to determine the destination address when forwarding from one stage to another)**,

an encoder **(to perform the encoding scheme shown in table 1 on page 1306 an encoder has to be part of each switching element)** for coding each one of the in-band control signals of the packets into a plurality of bits based on a predetermined coding algorithm, and

a generator **(The scatter network in Figure 4A of the Reverse Banyan Network generates the tags as shown in figure 4B)** for generating, with reference to the coding scheme **(See Table 1 on page 1306 – Yang'99 shows an encoding scheme for tag values based on a predetermined coding algorithm)**, the output bits

of the local output packets at each one of the switching elements based on a subset of the bits in the corresponding one of the in-band control signals for each one of the switching elements to route the local input packets arriving at the corresponding switching element, **(See page 1310, Column 1, Lines 3-20)** wherein each one of the switching elements is a *bicast cell* **(In Yang'99's system each switching element is capable of multicasting and therefore is a bicast cell and the definition is shown on page 1300, 2nd Column and the corresponding figures are 3A-3F. Yang'99's definition and description of the state of the switching connection for bicast cell is exactly like the Applicant's description of bicast cell defined on page 169 of the specification and exactly matches Applicant's Figures 2C-2F)** and the local input packets to each one of the switching elements includes idle **(Page 1300 case IV, Page 1306 Lines 13-20, Page 1310 Lines 25-27, Table 1)**, 0-bound **(Table 1)**, 1-bound **(Table 1)** and bicast packet types **(Page 1310, Lines 20-25)**,

wherein each one of the packet types corresponds to a distinct in-band control signal **(Cases 1-4 on page 1300 and in general 2nd column on page 1300)**, the coding includes coding each of the in-band control signals by two bits **(See in Section 5.1, 1st paragraph Yang'99 initially only uses 4 tag values where it is clear that the in-band control signal can be represented by only two bits. However, Yang'99 uses 3 bits to represent 6 tag values in Table 1 on page 1306 wherein the additional 2 tag values are dummy values as indicated by Yang'99 on page 1305. However, it is clear that such an arrangement wastes in-band bandwidth.)**,

and the coding algorithm includes coding the bits such that the first bit of the code for the in-band control signal corresponding to a 0-bound packet type **(See Case 1 on page 1300)** is different from the first bit of the code for the in-band control signal corresponding to a 1-bound packet type **(See Case 2 on page 1300)**. **(Further Yang clearly shows in Table 1 on page 1308 the encoding scheme for the tag values used as in-band control signal in the packets routed in the multi-stage multicast switch. Clearly three bits are used adequately meeting the claimed limitation of "using at least two bits". Also it is evident from Table 1 the first bit of the code for the 0 bound packet (i.e. tag = 0) is different from the first bit of the 1-bound packet (i.e. tag = 1) where the first bit is the most significant bit).**

Yang'99 fails to disclose that the coding includes coding each one of the in-bound control signals by two bits.

However, the above mentioned claimed limitations are well known in the art as evidenced by Li'101402. In particular, Li101402 discloses that the coding includes coding each one of the in-bound control signals by two bits **(Li'101402 shows in Section III in Table 1 using only two bits to encode the in-bound control signals used for determining routing destination. Namely the bits are Bit 1 and Bit 0**).

In view of the above, having the system of Yang'99 and then given the well established teaching of Li'101402, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the system of Yang'99 as taught by Li'101402, the motivation for such a modification being to conserve in-band bandwidth by using 2 bits instead of three bits.

Regarding **claim 6**, Yang’99 discloses, a system for routing packets comprising: multiple stages of switching elements **(In Yang’99’s Figures 1, 2, 4, and 5 contain multiple stages of switching elements)**, each one of the switching elements receiving packets as local input packets on its input ports and producing packets as local output packets on its output ports each of the packets having a plurality of in-band control signals where each one of the in-band control signals is utilized in a corresponding one of the switching elements as the local in-band control signal for the corresponding switching element to make switching decisions **(See page 1309, section 7.1, Yang’99 discloses how each multicast message is forwarded in the network using the header of the message as an in-band control to determine the destination address when forwarding from one stage to another)**,

an encoder **(to perform the encoding scheme shown in table 1 on page 1306 an encoder has to be part of each switching element)** for coding each one of the in-band control signals of the packets into a plurality of bits based on a predetermined coding algorithm, and

a generator **(The scatter network in Figure 4A of the Reverse Banyan Network generates the tags as shown in figure 4B)** for generating, with reference to the coding scheme **(See Table 1 – Yang’99 shows an encoding scheme for tag values based on a predetermined coding algorithm)**, the output bits of the local output packets at each one of the switching elements based on a subset of the bits in the corresponding one of the in-band control signals for each one of the switching elements to route the local input packets arriving at the corresponding switching

element, **(See page 1310, Column 1, Lines 3-20)** wherein each one of the switching elements is a _routing cell_ **(In Yang's system each switching element is capable of sorting under a linear order of 0-bound, idle, and 1-bound. This is effectively illustrated on Page 1306, in the second column in the first paragraph. Given this and the fact that the Applicant defines routing cell on page 161 of the specification simply as a sorting cell associated with a set consisting of 0-bound, idle, 1-bound and linearly ordered one can easily conclude Yang's cells are also routing cells.)** and the local input packets to each one of the switching elements includes idle **(Page 1300 case 4, Page 1306 Lines 13-20, Page 1310 Lines 25-27, Table 1)**, 0-bound **(Table 1)**, 1-bound **(Table 1)** and bicast packet types **(Page 1310, Lines 20-25)**, wherein each one of the packet types corresponds to a distinct in-band control signal **(Cases 1-4 on page 1300 and in general 2nd column on page 1300)**, the coding includes coding each of the in-band control signals by at least two bits **(See in Section 5.1, 1st paragraph Yang'99 initially only uses 4 tag values where it is clear that the in-band control signal can be represented by only two bits. However, Yang'99 uses 3 bits to represent 6 tag values in Table 1 on page 1306 wherein the additional 2 tag values are dummy values as indicated by Yang'99 on page 1305. However, it is clear that such an arrangement wastes in-band bandwidth.)**, and the coding algorithm includes coding the bits such that the first bit of the code for the in-band control signal corresponding to a 0-bound packet type **(See Case 1 on page 1300)** is different from the first bit of the code for the in-band control signal corresponding to a 1-bound packet type **(See Case 2 on page 1300)**. **(Further**

Yang clearly shows in Table 1 on page 1308 the encoding scheme for the tag values used as in-band control signal in the packets routed in the multi-stage multicast switch. Clearly three bits are used adequately meeting the claimed limitation of "using at least two bits". Also it is evident from Table 1 the first bit of the code for the 0 bound packet (i.e. tag = 0) is different from the first bit of the 1-bound packet (i.e. tag = 1) where the first bit is the most significant bit.).

Yang'99 fails to disclose that the coding includes coding each one of the in-bound control signals by two bits.

However, the above mentioned claimed limitations are well known in the art as evidenced by Li'101402. In particular, Li101402 discloses that the coding includes coding each one of the in-bound control signals by two bits **(Li'101402 shows in Section III in Table 1 using only two bits to encode the in-bound control signals used for determining routing destination. Namely the bits are Bit 1 and Bit 0**).

In view of the above, having the system of Yang'99 and then given the well established teaching of Li'101402, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the system of Yang'99 as taught by Li'101402, the motivation for such a modification being to conserve in-band bandwidth by using 2 bits instead of three bits.

Response to Arguments

4. Applicant's arguments with respect to claims 2, 3, 5, and 6 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HABTE MERED whose telephone number is (571)272-6046. The examiner can normally be reached on Monday to Friday 9:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Aung S. Moe can be reached on 571 272 7314. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Supervisory Patent Examiner, Art Unit 2616

/Habte Mered/
Examiner, Art Unit 2616